

GE Power & Water
Renewable Energy

Introducing GE's 1.6-100

Best-in-class
capacity factor

a product of
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imagination at work

GE's 1.6-100 Wind Turbine

GE's 1.6-100 wind turbine offers a 47% increase in swept area when compared to the 1.6-82.5 turbine, resulting in 19% increase in Annual Energy Production (AEP) at 7.5 m/s. This increase in blade swept area allows greater energy capture and improved project economics for wind developers. GE's 1.6-100 turbine has a 53% gross capacity factor, at 7.5 m/s; a class leading performance. GE's proprietary 48.7 meter blade uses the same proven aerodynamic shape as the blades found on the 2.5-100 turbine, but with the use of carbon fiber the weight is significantly reduced from the original blade predecessor.

GE's stringent design procedures result in a turbine designed for high performance, reliability and availability. The use of the rotor from the proven GE 2.5-100 turbine and selected component modifications provide increased annual production with the same reliable performance as the 1.5 MW series turbine.

Available in 80 meter and 100 meter tower heights, these sizes provide flexible options for Class III wind sites, allowing for higher energy capture in lower wind speed environments.

Building Upon the Proven 1.5 MW and 2.5 MW Platforms

The evolution of GE's 1.5 MW turbine design began with the 1.5i turbine introduced in 1996. The 65 meter rotor was increased to 70.5 meters in the 1.5s then to 77 meters in the 1.5sle turbine which was introduced in 2004. Building on the exceptional performance and reliability of the 1.5sle, GE introduced the 1.5xle with its 82.5 meter diameter in 2005. Subsequent improvements in design led to the 1.6-82.5 turbine, introduced in 2008. Ongoing investment in the industry workhorse resulted in the introduction of GE's 1.6-100 wind turbine with a 100 meter rotor. This product evolution ensures increased capacity factor while increasing AEP by 19%.

Incremental changes to the 1.6-100 resulted in a significant performance increase. These enhancements include greater blade length, use of carbon fiber, Low Noise Trailing Edge (LNTE) and gearbox improvements resulting in an increase in AEP, high capacity factor, and controlled sound performance.

GE's new, Low Noise Trailing Edge serrations are employed on this turbine to enable tailored sound as a function of wind speed for a smaller sound footprint and optimized park layout to increase AEP. Testing has shown this design for the blade enables improved turbine acoustic performance. Designed with high reliability to ensure continued operation in the field, GE's 1.6-100 can provide excellent availability comparable with the 1.5 MW series units operating in the field today.

Technical Description

GE's 1.6-100 wind turbine is a three-blade, upwind, horizontal axis wind turbine with a rotor diameter of 100 meters. The turbine rotor and nacelle are mounted on top of a tubular steel tower providing hub heights of 80 meters and 100 meters. The machine uses active yaw control to keep the blades pointed into the wind. The turbine is designed to operate at a variable speed and uses a doubly fed asynchronous generator with a partial power converter system.

Specifications:

1.6-100 Wind Turbine:

- Designed to IEC 61400-1
 - TC III: 7.5 m/s average wind speed; B turbulence intensity
- Standard and cold weather extreme options
- Standard tower corrosion protection; C2 internal and C3 external with optional C4 internal and C5 external available
- Rotational direction: Clockwise viewed from an upwind location
- Speed regulation: Electric drive pitch control with battery backup
- Aerodynamic brake: Full feathering of blade pitch

Features and Benefits

- Higher AEP than its 1.6 predecessors
- Highest capacity factor in its class
- Designed to meet or exceed the 1.5 MW platform's historic high availability
- Grid friendly options are available
 - Enhanced Reactive Power, Voltage Ride Thru, Power Factor Control
- Wind Farm Control System; WindSCADA*
- Sharing of components with family products
- GE proprietary 48.7 meter blade
- Ultra-quiet power production Low Noise Trailing Edge serrations as an acoustic enhancement for the 1.6-100
- Available in both 50 Hz and 60 Hz versions for global suitability

Construction

Towers: tubular steel sections provide variable hub heights from 80 meters to 100 meters

Blades: GE 48.7 meter blades with Low Noise Trailing Edge serrations

- Providing high energy capture with low sound emission
- Carbon spar caps within blades reduce weight, which reduces turbine loads

Drivetrain components: GE's 1.6-100 uses proven design gearboxes, mainshaft and generators with appropriate improvements to enable the larger rotor diameter on the 1.6 MW machine

Enhanced Controls Technology

The 1.6-100 wind turbine employs two enhanced control features:

- GE's patented Advanced Loads Control reduces loads on turbine components by measuring stresses and individually adjusting blade pitch
- Controls developed by GE Global Research minimize loads including at near rated wind speeds to improve Annual Energy Production (AEP)

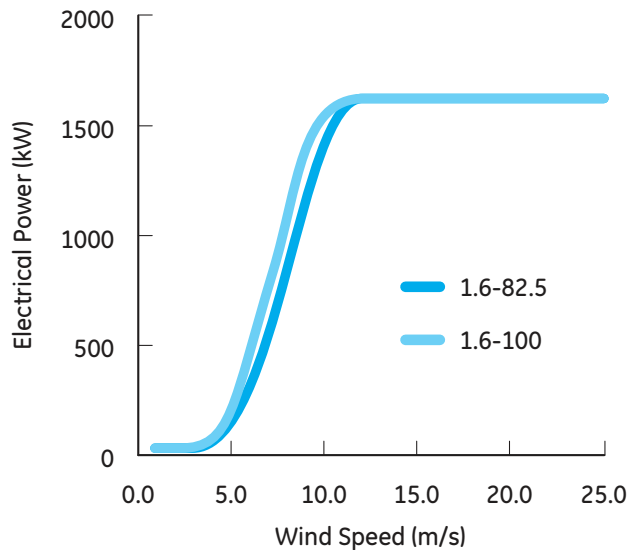
Condition Based Monitoring

GE's Condition Based Monitoring (CBM) and SCADA Anomaly Detection Services, a complementary suite of advanced condition monitoring solutions, proactively detect impending drive train and whole-turbine issues enabling increased availability and decreased maintenance expenses. Built upon half a century of power generation drivetrain and data anomaly monitoring experience, this service solution is available as an option on new GE Units and as an upgrade.



1.6-100 Specifications

Power Curve Improvement



Highest capacity factor in its class

- **Value.** Best in Class Capacity Factor, 53% @ 7.5 m/s
- **Reliability.** GE fleet at 98%+ availability
- **Experience.** 16,500+ fleet, most 100 meter+ rotors, 2.1 million operating hours
- **Finance-ability.** Evolutionary design using "proven technology" from GE 1.5 MW and 2.5 MW platforms



Best in class capacity factor



1.6 MW wind turbine, Tahachapi, California, U.S.A.

Powering the world...responsibly.

For more information please visit www.ge-energy.com/wind.



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GEA18628 (04/2011)